

8. REGULATIONS AND ADVISORIES

The international, national, and state regulations and guidelines regarding tungsten in air, water, and other media are summarized in Table 8-1.

No MRLs were derived for inhalation or oral exposure to tungsten or tungsten compounds.

EPA has not classified tungsten or tungsten compounds for carcinogenicity, nor has the EPA derived reference concentrations (RfCs) or reference doses (RfDs) for tungsten or tungsten compounds (IRIS 2003). Levels of tungsten and tungsten compounds are not regulated in water.

8. REGULATIONS AND ADVISORIES

Table 8-1. Regulations and Guidelines Applicable to Tungsten

| Agency | Description | Information | Reference |
|-----------------------------|----------------------------------------------------------------------|----------------------|------------------------------------------|
| <u>INTERNATIONAL</u> | | | |
| Guidelines: | | | |
| IARC | Carcinogenicity classification | No data | |
| WHO | Drinking water and air quality guidelines | No data | |
| <u>NATIONAL</u> | | | |
| Regulations and Guidelines: | | | |
| a. Air: | | | |
| ACGIH | TLV (8-hour TWA) | | ACGIH 2003 |
| | Tungsten (as W) | | |
| | Metal and insoluble compounds | 5 mg/m ³ | |
| | STEL | 10 mg/m ³ | |
| | Soluble compounds | 1 mg/m ³ | |
| NIOSH | STEL | 3 mg/m ³ | NIOSH 2003 |
| | REL (10-hour TWA) | | |
| | Tungsten (also applies to other insoluble tungsten compounds [as W]) | 5 mg/m ³ | |
| | STEL (15-minute TWA) | 10 mg/m ³ | |
| | Occupational values | | |
| NRC | Oral ingestion | ALI (μCi) | NRC 2003 10 CFR 20, Appendix B |
| | ¹⁷⁶ W | 1.0x10 ⁴ | |
| | ¹⁷⁷ W | 2.0x10 ⁴ | |
| | ¹⁷⁸ W | 5.0x10 ³ | |
| | ¹⁷⁹ W | 5.0x10 ⁵ | |
| | ¹⁸¹ W | 2.0x10 ⁴ | |
| | ¹⁸⁵ W (LLI wall) | 2.0x10 ³ | |
| | ¹⁸⁵ W | 3.0x10 ³ | |
| | ¹⁸⁷ W | 2.0x10 ³ | |
| | ¹⁸⁸ W (LLI wall) | 4.0x10 ² | |
| | ¹⁸⁸ W | 5.0x10 ² | |
| | Occupational values | | NRC 2003 10 CFR 20, Appendix B |
| | Inhalation ^a | ALI (μCi) | |
| | ¹⁷⁶ W | 5.0x10 ⁴ | |
| | ¹⁷⁷ W | 9.0x10 ⁴ | |
| | ¹⁷⁸ W | 2.0x10 ⁴ | |
| | ¹⁷⁹ W | 2.0x10 ⁶ | |
| | ¹⁸¹ W | 3.0x10 ⁴ | |
| | ¹⁸⁵ W (LLI wall) | 7.0x10 ³ | |
| | ¹⁸⁷ W | 9.0x10 ³ | |
| | ¹⁸⁸ W (LLI wall) | 1.0x10 ³ | |
| OSHA | PEL (8-hour TWA) for general industry | No data | OSHA 2003b 29 CFR 1926.55, Appendix A |
| | PEL (8-hour TWA) for construction industry | | |
| | Tungsten (as W) | | |
| | Insoluble compounds | 5 mg/m ³ | |
| | Soluble compounds | 1 mg/m ³ | |

8. REGULATIONS AND ADVISORIES

Table 8-1. Regulations and Guidelines Applicable to Tungsten

| Agency | Description | Information | | Reference |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------|--------------------------------------|
| NATIONAL (cont.) | | | | |
| OSHA | PEL (8-hour TWA) for shipyard industry Tungsten | | | OSHA 2003a 29 CFR 1915.1000 |
| | Insoluble compounds | 5 mg/m ³ | | |
| | Soluble compounds | 1 mg/m ³ | | |
| b. Water | No data | | | |
| c. Food | No data | | | |
| d. Other | | | | |
| ACGIH | Carcinogenicity classification | No data | | |
| EPA | Carcinogenicity classification | No data | | |
| | RfD | No data | | |
| | Effluent guidelines and standards; nonferrous metals manufacturing point source category applicable to discharges resulting from the production of tungsten at primary tungsten facilities | | | EPA 2003a 40 CFR 421.100 |
| | Effluent guidelines and standards; nonferrous metals manufacturing point source category applicable to discharges resulting from the production of tungsten or cobalt at secondary tungsten and cobalt facilities processing tungsten or tungsten carbide scrap raw materials | | | EPA 2003b 40 CFR 421.310 |
| NRC | Effluent concentrations | Air (μ Ci/mL) | Water (μ Ci/mL) | NRC 2003 10 CFR 20, Appendix B |
| | ¹⁷⁶ W | 7.0x10 ⁻⁸ | 1.0x10 ⁻⁴ | |
| | ¹⁷⁷ W | 1.0x10 ⁻⁷ | 3.0x10 ⁻⁴ | |
| | ¹⁷⁸ W | 3.0x10 ⁻⁸ | 7.0x10 ⁻⁵ | |
| | ¹⁷⁹ W | 2.0x10 ⁻⁶ | 7.0x10 ⁻³ | |
| | ¹⁸¹ W | 5.0x10 ⁻⁸ | 2.0x10 ⁻⁴ | |
| | ¹⁸⁵ W (LLI wall) | 9.0x10 ⁻⁹ | No data | |
| | ¹⁸⁵ W | No data | 4.0x10 ⁻⁵ | |
| | ¹⁸⁷ W | 1.0x10 ⁻⁸ | 3.0x10 ⁻⁵ | |
| | ¹⁸⁸ W (LLI wall) | 2.0x10 ⁻⁹ | No data | |
| | ¹⁸⁸ W | No data | 7.0x10 ⁻⁶ | |

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Table 8-1. Regulations and Guidelines Applicable to Tungsten

| Agency | Description | Information | Reference |
|-------------------------|-------------------|--------------------------------------------------|--------------------------------------|
| <u>NATIONAL</u> (cont.) | | | |
| NRC | Release to sewers | Monthly average <u>concentration (μCi/mL)</u> | NRC 2003 10 CFR 20, Appendix B |
| | ¹⁷⁶ W | 1.0x10 ⁻³ | |
| | ¹⁷⁷ W | 3.0x10 ⁻³ | |
| | ¹⁷⁸ W | 7.0x10 ⁻⁴ | |
| | ¹⁷⁹ W | 7.0x10 ⁻² | |
| | ¹⁸¹ W | 2.0x10 ⁻³ | |
| | ¹⁸⁵ W | 4.0x10 ⁻⁴ | |
| | ¹⁸⁷ W | 3.0x10 ⁻⁴ | |
| | ¹⁸⁸ W | 7.0x10 ⁻⁵ | |
| <u>STATE</u> | | | |
| a. Air | No data | | |
| b. Water | No data | | |
| c. Food | No data | | |
| d. Other | No data | | |

^aThe ALIs and DACs for inhalation are given for an aerosol with an activity median aerodynamic diameter (AMAD) of 1 μm and for class D of radioactive material, which refers to their retention (clearance half-times of <10 days) in the pulmonary region of the lung.

ACGIH = American Conference of Governmental Industrial Hygienists; ALI = annual limits on intakes; CFR = Code of Federal Regulations; DAC = derived air concentrations; EPA = Environmental Protection Agency; IARC = International Agency for Research on Cancer; LLI = lower large intestine; NIOSH = National Institute for Occupational Safety and Health; NRC = Nuclear Regulatory Commission; OSHA = Occupational Safety and Health Administration; PEL = permissible exposure limit; REL = recommended exposure limit; RfD = reference dose; STEL = short-term exposure limit; TLV = threshold limit values; TWA = time-weighted average; WHO = World Health Organization